Claims

Original claims 1, 2, 4-10, 12-16, and previously amended claims 3 and 11 remain in the application as follows:

1(original). A stabilized laser system comprising:

a plurality of n lasers, each of which, while emitting light and having a preselected portion thereof fed back thereto, causes the fed back portion to be amplified and shifted in wavelength in a first direction which is spaced apart from a center wavelength of the feedback signal;

a feedback stabilization arrangement coupled to the plurality of n lasers for generating a feedback signal having a wavelength spectrum peaking at a wavelength shifted in an opposite direction to the first direction generated by plurality of n lasers in response to the feedback signal so as to provide an output signal at the output of the stabilized laser system having a wavelength spectrum that peaks essentially at a desired wavelength; and

a reflector located at a predetermined signal roundtrip time delay distance from the feedback stabilization arrangement for receiving the output signal therefrom, for passing a first portion thereof therethrough, and for reflecting a remaining second portion thereof back to the feedback stabilization arrangement as a secondary feedback signal that contributes to

each of the plurality of n laser sources being set in a stable coherence collapse mode.

2(original). The apparatus of claim 1 further comprising a delay line located external to the feedback stabilization arrangement and before the reflector for providing a predetermined delay to a signal passing therethrough in either direction such that the secondary feedback signal received at each of the plurality of n laser sources sets the laser source in the stabile coherence collapse mode.

3(previously amended). The apparatus of claim 1 wherein the feedback stabilization arrangement comprises:

a multiplexer/demultiplexer comprising first and second input/outputs;

a broadband power splitter comprising first, second, and third ports, for receiving the output signal from the second input/output port of the multiplexer/demultiplexer at said first port thereof and for splitting said received output signal into first and second portions for delivery to the second and third ports thereof, respectively, the second port providing the output signal from the feedback stabilization arrangement to the external reflector; and

the multiplexer/demultiplexer further comprises a third input/output port coupled to the third port of the broadband power splitter, the multiplexer/demultiplexer being designed to demultiplex and filter a multiplexed signal received at the third input/output port with a second spectral response that is different from the first spectral response for providing a

feedback signal to corresponding ones of the plurality of n first input/output ports thereof that is shifted in a second direction, and for multiplexing signals received from the plurality of n laser sources at the plurality of first input/output ports with the second spectral response for delivery to the third input/output port thereof.

4(original). The apparatus of claim 3 wherein:

the broadband power splitter further comprises a fourth port where signals received at the second and third port thereof are each split into first and second portions, each first portion being delivered to the first port thereof and each second portion being delivered to the fourth port thereof, and signals received at the first and fourth ports thereof are each split into first and second portions, each first portion being delivered to the second port thereof and each second portion being delivered to the third port thereof; and

the feedback stabilization arrangement further comprises:

a second power splitter comprising first, second, and third ports, the first port being coupled to the fourth port of the broadband power splitter such that a signal received at the first port thereof is split into first and second portions that are delivered to the second and third ports thereof, respectively, and signals received at the second and third ports are combined and delivered to the first port thereof; and

a multiplexer/demultiplexer arrangement comprising: a first and second input/output ports coupled to the second and third ports, respectively, of the second power splitter; and

a pair of multiplexer/demultiplexers that are coupled between the first and second input/output ports for demultiplexing and filtering a received multiplexed signal at each of the first and second ports thereof with a third spectral response that is different than the first and second spectral responses, and then multiplexing and filtering the demultiplexed signals for transmission from the other one of the first and second ports thereof back to the second power splitter.

5(original). Apparatus comprising:

a feedback stabilization arrangement comprising a multiplexer/demultiplexer comprising a plurality of n first input/output ports and a second input/output port, each first input/output port being adapted for receiving an output wavelength signal from a corresponding one of a plurality of n laser sources for filtering and multiplexing the received laser source signals using a first spectral response for generating a filtered and multiplexed output signal for transmission from the feedback stabilization arrangement at the second input/output port thereof, and for generating a filtered and demultiplexed feedback signal by the multiplexer/demultiplexer that is wavelength shifted by a predetermined amount and direction for transmission back to an output port of each of the corresponding ones of the plurality of n laser sources for stabilizing each of

said plurality of laser sources at a desired output center wavelength; and

a reflector located at a predetermined signal roundtrip time delay distance from the feedback stabilization arrangement for receiving the filtered and multiplexed output signal from the feedback stabilization arrangement, for passing a first portion thereof therethrough, and for reflecting a remaining second portion back to the feedback stabilization arrangement as a secondary feedback signal that contributes to each of the plurality of n laser sources being set in a stabile coherence collapse mode.

6(original). The apparatus of claim 5 further comprising a delay line located external to the feedback stabilization arrangement and before the reflector for providing a predetermined delay to a signal passing therethrough in either direction such that the secondary feedback signal received at each of the plurality of n laser sources sets the laser source in the stabile coherence collapse mode.

7(original). The apparatus of claim 5 wherein the feedback stabilization arrangement further comprises:

a broadband power splitter comprising a first, second, and third port for receiving the multiplexed output signal from the second input/output port of the multiplexer/demultiplexer at said first port and splitting said received multiplexed output signal into first and second portions for delivery to the second and third ports thereof, respectively, the second port providing

the output signal from the feedback stabilization arrangement to the external reflector; and

the multiplexer/demultiplexer further comprises a third input/output port coupled to the third port of the broadband power splitter, the multiplexer/demultiplexer being designed to demultiplex and filter a multiplexed signal received at the third input/output port with a second spectral response that is different from the first spectral response for providing a feedback signal to corresponding ones of the plurality of n first input/output ports thereof that is shifted by the predetermined amount and direction, and for multiplexing signals received from the plurality of n laser sources at the plurality of first input/output ports with the second spectral response for delivery to the third input/output port thereof.

8(original). The apparatus of claim 7 wherein:

the broadband power splitter further comprises a fourth port where signals received at the second and third port thereof are each split into first and second portions, each first portion being delivered to the first port thereof and each second portion being delivered to the fourth port thereof, and signals received at the first and fourth ports thereof are each split into first and second portions, each first portion being delivered to the second port thereof and each second portion being delivered to the third port thereof; and

the feedback stabilization arrangement further comprises:

a second power splitter comprising first, second, and third ports, the first port being coupled to the fourth port of the broadband power splitter such that a signal received at the first port thereof is split into first and second portions that are delivered to the second and third ports thereof, respectively, and signals received at the second and third ports are combined and delivered to the first port thereof; and

a multiplexer/demultiplexer arrangement comprising: a

first and second input/output ports coupled to the second and third ports, respectively, of the second power splitter; and

a pair of multiplexer/demultiplexers that are coupled between the first and second input/output ports for demultiplexing and filtering a received multiplexed signal at each of the first and second ports thereof with a third spectral response that is different than the first and second spectral responses, and then multiplexing the filtered and demultiplexed signals for transmission from the other one of the first and second ports thereof back to the second power splitter.

9(original). A feedback stabilization system comprising:

a plurality of n laser sources, each laser source, which, while emitting light and having a preselected portion thereof fed back thereto, causes the fed back portion to be amplified and shifted in wavelength in a first direction which is spaced apart from the center wavelength of the feedback signal;

a feedback stabilization arrangement comprising a multiplexer/demultiplexer comprising a plurality of n first

input/output ports, each first input/output port being coupled for receiving an output signal from a corresponding one of the plurality of n laser sources for filtering the received signals using a first spectral response and multiplexing the received signals for generating a filtered and multiplexed output signal at a second input/output port thereof for use as an output signal from the feedback stabilization arrangement, and for generating a filtered and demultiplexed feedback signal by the multiplexer/demultiplexer that is wavelength shifted by a predetermined amount and direction for transmission back to an output port of each of the corresponding ones of the plurality of n laser sources for stabilizing each of said plurality of laser sources at the desired output center wavelength; and

a reflector located at a predetermined signal round-trip time delay distance from the feedback stabilization arrangement for receiving the multiplexed output signal from the feedback stabilization arrangement, for passing a first portion thereof therethrough, and for reflecting a remaining second portion back to the feedback stabilization arrangement as a secondary feedback signal that contributes to each of the plurality of n laser sources being set in a stabile coherence collapse mode.

10(original). The apparatus of claim 9 further comprising a delay line located between the feedback stabilization arrangement and the reflector for providing a predetermined delay to a signal passing therethrough in either direction such that the secondary feedback signal received at each of the plurality of n laser

sources sets the laser source in the stabilized coherence collapse mode.

11(previously amended). The apparatus of claim 9 wherein the feedback stabilization arrangement further comprises:

a broadband power splitter comprising a first, second, and third port for receiving the multiplexed output signal from a second input/output port of the multiplexer/demultiplexer at the first port thereof and splitting said received signal into first and second portions for delivery to the second and third ports thereof, respectively, the second port providing the output signal from the feedback stabilization arrangement to the external reflector; and

the multiplexer/demultiplexer further comprises a third input/output port coupled to the third port of the broadband power splitter, the multiplexer/demultiplexer being designed to demultiplex and filter a multiplexed signal received at the third input/output port with a second spectral response that is different from the first spectral response for providing a feedback signal to corresponding ones of the plurality of n first input/output ports thereof that is shifted in a second direction, and for multiplexing signals received from the plurality of n laser sources at the plurality of first input/output ports with the second spectral response for delivery to the third input/output port thereof.

12(original). The apparatus of claim 11 wherein:

the broadband power splitter further comprises a fourth port where signals received at the second and third port thereof

are each split into first and second portions, each first portion being delivered to the first port and each second portion being delivered to the fourth port, and signals received at the first and fourth ports thereof are each split into first and second portions, each first portion being delivered to the second port and each second portion being delivered to the third port; and

the feedback stabilization arrangement further comprises:

a second power splitter comprising first, second, and third ports, the first port being coupled to the fourth port of the broadband power splitter such that a signal received at the first port thereof is split into first and second portions that are delivered to the second and third ports thereof, respectively, and signals received at the second and third ports are combined and delivered to the first port thereof; and

a multiplexer/demultiplexer arrangement comprising: a

first and second input/output ports coupled to the second and third ports, respectively, of the second power splitter; and

a pair of multiplexer/demultiplexers that are coupled between the first and second input/output ports for demultiplexing and filtering a received multiplexed signal at each of the first and second ports thereof with a third spectral response that is different than the first and second spectral responses, and then multiplexing the filtered and demultiplexed signals for transmission from the other one of the first and second ports thereof back to the second power splitter.

13(original). A method of stabilizing a laser system to generate an output signal having a desired wavelength comprising the steps of:

(a) generating light signals from each of a plurality of n laser sources, which, while emitting light and having a preselected portion thereof fed back thereto, the output signal of each of the plurality of n laser sources is shifted in wavelength in a first direction which is spaced apart from a center wavelength of the feedback signal;

(b) generating a feedback signal in a feedback stabilization arrangement that is coupled to the plurality of n laser sources having a wavelength spectrum peaking at a wavelength shifted in an opposite direction to the first direction generated by the plurality of n lasers in response to the feedback signal so as to provide an output signal at the output of the stabilized laser system having a wavelength spectrum that peaks essentially at the desired wavelength; and

(c) reflecting a portion of the output signal from the stabilized laser system from step (b) back into the laser system as a secondary feedback signal that is delay by a predetermined amount for contributing to each of the plurality of n laser sources being set in a stable coherence collapse mode.

14(original). The method of claim 13 wherein in step (b) performing the substeps of:

(b1) multiplexing and filtering the output channel signals from the plurality of n laser sources with a

predetermined first spectral response for generating a multiplexed output signal;

(b2) dividing the multiplexed output signal from step (b1) into first and second portions thereof, said first portion being coupled to provide an output signal from the laser system;

(b3) processing the second portion of the multiplexed output signal from step (b2) such that the wavelength thereof is shifted in an opposite direction to the first direction;

(b4) demultiplexing and feeding back the processed second portion of the signal from step (b2) to the input/output of corresponding ones of the plurality of n laser sources such that the output signal of the laser system is stabilized at essentially the desired wavelength.

15(original). The method of claim 14 wherein in step (b3) performing the substep of:

(b3a) processing the second portion of the multiplexed output signal from step (b2) with a predetermined second spectral response which is different than the first spectral response to generate a feedback signal to each of the plurality of n laser sources that is shifted in an opposite direction to the first direction.

16(original). The method of claim 14 wherein:

in step (b2) performing the substep of:

(b2a) receiving the multiplexed output from step (b1) at the first port of a broadband power splitter thereof and splitting said received signal into first and second portions for delivery to second and third ports thereof, respectively, the

second port providing the output signal from the laser system; and

in step (b3) performing the substep of:

(b3a) processing the second portion of the multiplexed output signal from step (b2) with a predetermined second spectral response which is different than the first spectral response to generate a feedback signal to each of the plurality of n laser sources that is shifted in an opposite direction to the first direction.